Math 125 Quiz 4 Spring 2017 Name: _____

TA: Reynolds Trifunovski Zheng **Discussion Time** 8 9 10 11

A farmer is deciding how much of her land to plant in each of two crops: wheat and corn. She determines the following constraints.

$$\begin{cases} x + y \leq 1000 \\ 0.1x + 0.2y \leq 160 \\ 3x + 2y \geq 2400 \\ x \geq 0 \\ y \geq 0 \end{cases}$$

$y \leq 1000 - x$ (1000, 0), (0, 1000)

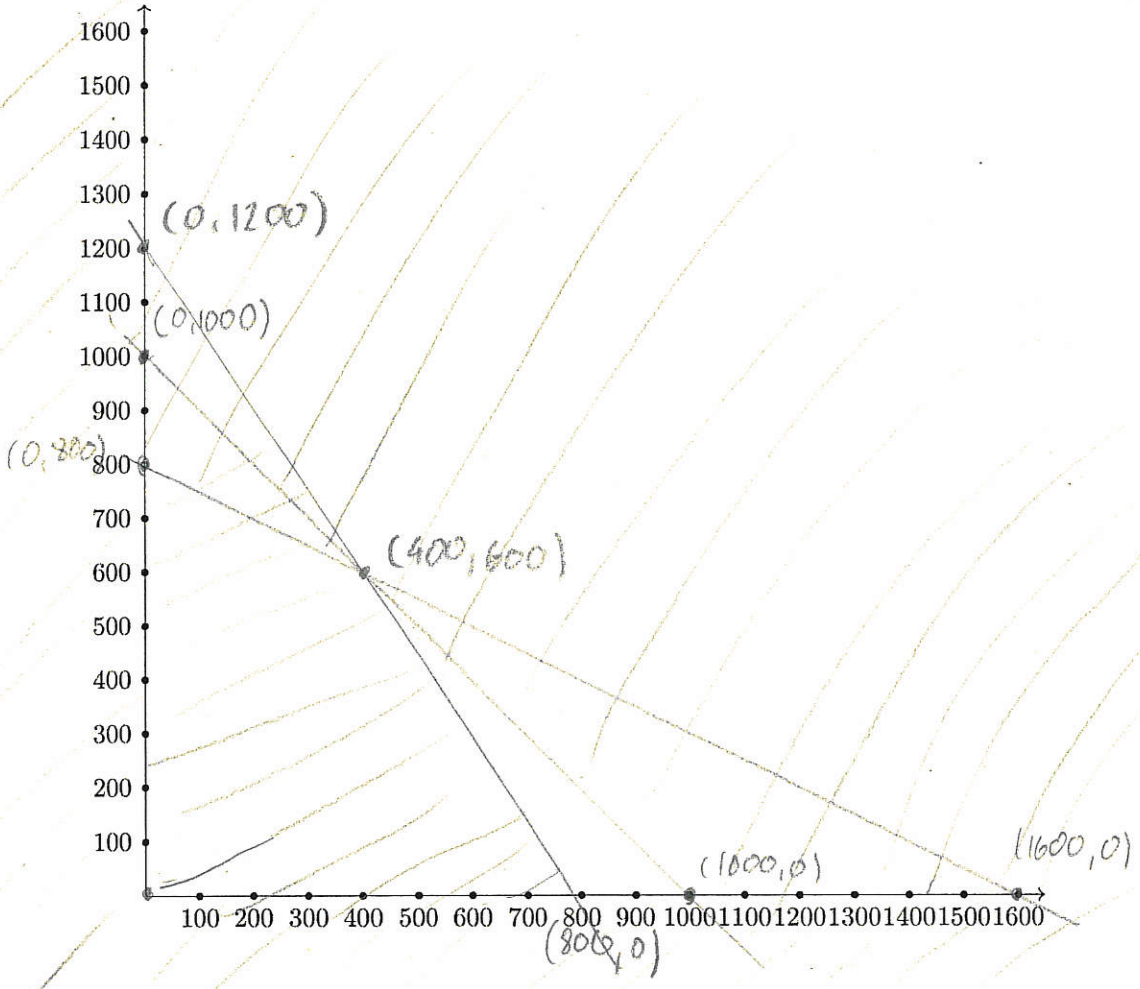
$y \leq 800 - \frac{1}{2}x$. (0, 800), (1600, 0)

$x \geq 0$

$y \geq 0$

$y \geq -\frac{3}{2}x + 1200$

1. (9 pts) Sketch the feasible set corresponding to the above constraints. Label all intercepts and vertices. (0, 1200) (800, 0)



$1000 - x = 800 - \frac{1}{2}x$

$2000 - 2x = 1600 - x$

$x = 400$

$y = 600$

A second farmer is deciding how much of his land to plant in each of two crops: wheat and soybeans. He wants to plant at least 500 acres in total. Each acre of wheat requires \$30 in chemical cost. Each acre of soybeans requires \$40 in chemcial cost. He can spend at most \$18,000 on chemicals. Each acre of wheat requires 1 gallon of fuel. Each acre of soybeans requires 4 gallons of fuel. He can use at most 800 gallons of fuel. Each acre of wheat yields a profit of \$100. Each acre of soybeans yields a profit of \$150. His goal is to maximize profit.

2. (5 pts)Let x be the number of acres in wheat and y the number of acres in soybeans. Write all the constraints corresponding to the above scenario.

$x + y \geq 500$

$30x + 40y \leq 18000$

$x + 4y \leq 800$

$x \geq 0$

$y \geq 0$

3. (3 pts) Identify the objective function.

$100x + 150y$

4. (3 pts) The feasible set has vertices at (500,0), (600,0), (400,100) and (500,75). Find the combination of acres of wheat and soybeans that maximizes his profit.

x	y	$100x + 150y$
500	0	50000
600	0	60000
400	100	55000
500	75	61250

To maximize profit he should plant 500 acres of wheat and 75 acres of soybeans.